# A WiMAX Networked UAV Telemetry System for Net-Centric Remote Sensing and Range Surveillance, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

A WiMAX networked UAV Telemetry System (WNUTS) is designed for net-centric remote sensing and launch range surveillance applications. WNUTS integrates a MIMO powered and WiMAX networked Tracking Antenna and Radio Link (TARL) system for UAV telemetry, a net-centric software package for application support, and a WiMAX groundstation network infrastructure for range extension and persistent mission automation. TARL links a remotely deployed UAV/airship sensor platform to a groundstation network with a 100+ Mbps bandwidth over a 30+ mile range using our innovative aerial/ground antenna technologies and carrier-grade WiMAX radio technologies. The WNUTS net-centric software supports real time remote sensing/telemetry applications. These include web-enabled graphic user interfaces for visualizing real time UAV missions in 3D flight through animation, performing real time GPS/IMU data processing for direct remote sensing data geo-reference, generating geo-referenced image QuickMosaics, and displaying selective inch-level high-resolution image contents. WNUTS web-based software tools enable web-collaborated data processing and information exploitation, extraction, and dissemination for remote sensing applications. The WiMAX groundstation network infrastructure flexibly extends UAV telemetry coverage for either long corridors (e.g. borders) or large block areas (e.g. launch range, cities) by appropriately configuring and deploying networked TARL groundstation cells (fixed or mobile). Using WiMAX and other COTS components, WNUTS is low cost, easy to maintain, and easily upgradeable.

Anticipated Benefits

WNUTS provides a fully-integrated, cost-effective, WiMAX-networked UAV Telemetry solution that allows diverse UAV, airship, and aerostat remote sensing platforms to provide real-time high-resolution situational awareness. With its leading-edge throughput, range coverage and reliable connectivity for net-centric aerial high resolution spectral imaging remote sensing, WNUTS has many potential commercial applications. These include homeland security; news broadcasting; transport, safety and security monitoring; forestry and park services; precision agriculture; crop growth status monitoring; disaster response and management; land-use surveys; environmental monitoring and urban planning. WNUTS is a low-cost, state-of-the-art broadband and long range UAV/Airship telemetry system that is compatible with Flight Landata's inch-level high-resolution spectral imaging and stereovision camera systems to provide real-time situational awareness remote sensing solutions over large areas. WNUTS near term applications include supporting: 1) automated collection and transfer of spaceship launch range surveillance/intrusion data for range operations such as launches, hazardous processing, and recovery; 2) UAV remote sensing for calibration and validation of a multitude of hyperspectral and multispectral satellites; 3) NASA Earth Science Enterprise remote sensing application development. WNUTS long term NASA applications include: 1) Mars UAV telemetry; 2) Lunar and other planetary surface robot

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

telemetry and orbit access links.

Primary U.S. Work Locations and Key Partners
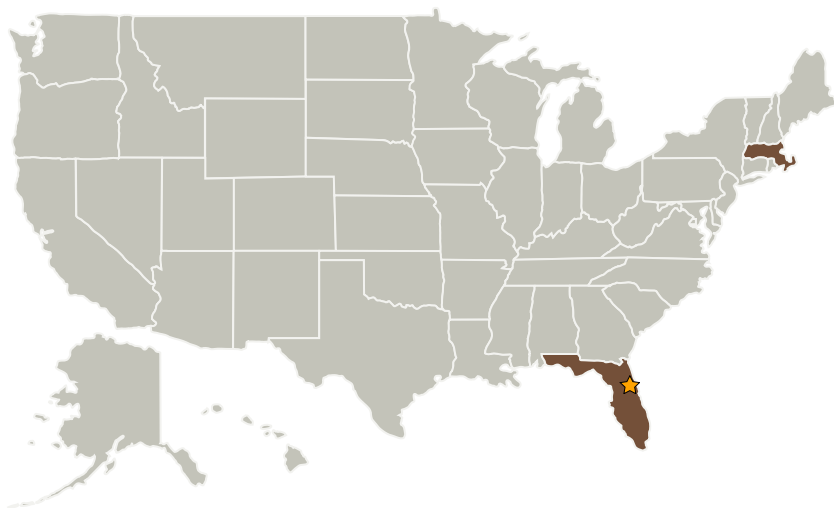
Organizations Performing Work	Role	Type	Location
⭐Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Flight Landata, Inc.	Supporting Organization	Industry	North Andover, Massachusetts

Primary U.S. Work Locations	
Florida	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Jennifer Murray

Principal Investigator:

Xiuhong Sun

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  └ TX16.5 Range Tracking, Surveillance, and Flight Safety Technologies